# Some Enteric Fever Epidemics

## Contents.



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I have no hesitation in awarding
"Commendation" to this Thesis.
MB

x This is not strictly correct, as will be seen from Marchioness's & other husbands accounts. Jenner's merits were great; but as to the bare "facts" he had been anticipated by Stewart & others. MK

## Relative Prevalence of Enteric Fever.

Enteric, Typhoid, or Pythogenic Fever as Murchison calls it is, in name only however, a disease essentially of the present century. The Intestinal Lesion which is characteristic of it, was discovered at the beginning of the century, but the true bearings of this fact, were not appreciated till Louis in 1829 introduced the term "fièvre typhoïde" from its fancied resemblance to Typhus fever with which indeed it had been up to that time confounded. Jenner in papers published in 1849-51 first brought forward facts to prove that Typhus & "fièvre typhoïde" were two diseases & what is more important, owed their origin to distinct Specific causes.

Medical writers before the 19th Century have, however, given descriptions of "Slow nervous fevers" (Gilchrist 1734) & putrid Malignant fevers" (Huxham 1738), which can easily be recognised as descriptions of fevers which now we would class under the term "Enteric". This confusion however of Enteric with Typhus renders any comparison between its prevalence in different epochs quite impossible.

Even up to so late a date as 1880, you find Enteric, Typhus, & ill-defined fevers, grouped in one class in Statistical enquiries and while the death rate from these fevers shows a very marked and gratifying reduction yet this is rather due to Typhus fever having been almost eradicated from the country than to any great diminution in the number of cases of Enteric. The greater accuracy in diagnosis which prevails & the consequent greater care which is exercised in nursing such cases will probably be found to be important factors in this reduction.

Wm Newsholme in his "Vital Statistics" (page 175) gives the following table of the death-rate per million living for seven successive years:-

| | 1881. | 1882. | 1883. | 1884. | 1885. | 1886. | 1887. |
|---|---|---|---|---|---|---|---|
| Enteric Fever | 212. | 229. | 227. | 234. | 173. | 184. | 184. |
| Typhus .. | 21. | 36. | 33. | 12. | 12. | 9. | 7. |

If now you compare these figures with those given by Dr Tatham as the Sickness rate per 1000 of population from Enteric & Typhus in 41 Notification Towns, you will see that, while the diminution in prevalence of Enteric is more apparent than real, that of typhus is both apparent & real.

Sickness rate per 1,000 of population from Typhus and Enteric Fever in 41 Notification Towns.

| | 1883 | 1884 | 1885 | 1886. | 1887. |
|---|---|---|---|---|---|
| Enteric Fever | 1·21 | 1·55 | 1·34 | 1·40 | 1·29 |
| Typhus " | 0·14 | 0·10 | 0·11 | 0·09 | 0·07 |

Thus from 1883 to 1887 the Sickness rate in these towns has fluctuated considerably for Enteric & on the whole has rather increased while the death rate from the same fever throughout the whole county has very considerably decreased. The steady and rapid decrease both in the Sickness rate (50% - 4 years) & in the death rate from Typhus is very striking.

While necessarily it is impossible to attach any great importance to Statistics for such short periods of time yet they are suggestive & the more general adoption of the Notification Act will, in time, give them an importance which can scarcely be over-estimated.

The town of Paisley has for years back had an unenviable notoriety as a hot-bed of Enteric fever. & certainly the Statistics given do not belie its reputation.

# Enteric Fever Outbreaks in Paisley.

| Year | 1887 | 1888 | 1889 | 1890 | 1891 | 1892 | 1893 |
|---|---|---|---|---|---|---|---|
| January | 9 | 19 | 11 | 2 | 3 | 3 | 6 |
| February | 2 | 14 | 7 | 11 | 1 | 7 | 6 |
| March | 3 | 13 | 3 | 15 | 1 | 4 | 5 |
| April | 4 | 1 | 4 | 4 | 0 | 3 | 6 |
| May | 0 | 3 | 8 | 2 | 5 | 5 | 2 |
| June | 3 | 1 | 4 | 1 | 1 | 6 | 3 |
| July | 5 | 6 | 3 | 2 | 1 | *13 | ⊕75 |
| August | 16 | 5 | 19 | 2 | —16 | 85 | 143 |
| September | 43 | 19 | 32 | 4 | 11 | 16 | |
| October | 42 | 9 | 30 | 3 | 18 | 15 | |
| November | 11 | 13 | 12 | 2 | 15 | 10 | |
| December | *127 | 11 | 7 | 7 | 3 | 11 | |

* Indicates Milk Epidemics

⊕ .... Ice-Cream Epidemic

— .. Commencement of Notification Act.

From these it is evident that practically since 1887, this fever has never been absent from the town. Prior to the adoption of the Notification Act in August 1891, there are only 2 months when we have no notice of Enteric Fever being present, while since the adoption of the Act, cases have been notified every month.

Considering these cases in relation to the population we find that the sickness rate per thousand of population has varied considerably in successive years, this in 1890 it was as low as 1·2 while in 1893 it has been over 7·0 per thousand.

## II Mode of Infection.

Before considering the channels of infection, it may not be out of place to give a brief resumé of the discovery of Eberth's bacillus.

Although the lesion of Typhoid fever was discovered at the beginning of the Century, it was not till 1871 that Von Recklinghausen observed colonies of micrococci in the kidneys of patients who had died of this disease & these he looked upon "as an indication where the localisation of the problematical spore was especially to be sought" In 1872 Eberth in "Zur Kenntniss der Bacterischen Mycosen" corroborated Recklinghausen's observations & maintained that these bacteria stood in causal relation to the Typhoid process. Various other observers, including Klein in 1875, Browicz in 1875 and Fischel in 1876, described variously shaped bacteria as occurring in the Intestinal mucous membrane, myocardium, Kidneys and Spleen of fatal Cases of Enteric.

In 1880 Eberth published another article on the

subject which is very important as in it he described a rod shaped organism which is definite in its form, in its arrangements in diseased organs & in its reaction with staining reagents. This organism he looks upon as standing in etiological relation to the Typhoid process.

Meanwhile Klebs had been making researches in the same direction & published the result of these in Virchow's Archives Vol 83. In these papers he brought forward what he called the "Bacillus Typhosus" which occurs in long, undivided, and unbranched threads, and which he maintained was the true germ of Typhoid.

The researches of R. Koch, W. Meyer, Coats and Crocke corroborate Eberth's conclusion in regard to the rod shaped bacillus being the true germ of Enteric, the long threads of Klebs being merely "the highest type of Schizomycetes occurring in the Sloughs" (Meyer).

The main fact made out in support of this view is that, while Klebs micro-organism only occurs in necrosed tissue, Eberths bacillus

occurs in the deeper non-necrotic layers of the mucous membrane. An important point in Eberth's researches is that his examinations of the lungs in Typhoid Cases always gave a negative result.

Regarding the Channels by which the Typhoid bacillus gains admission into the human organism we may says that there are two in number; viz

I Through the Respiratory Tract?

II Through the Digestive Tract?

I Regarding the first of these Channels it is very questionable whether the Typhoid bacillus ever reaches the lungs and if it does so Eberth's researches favour the idea that it cannot develope there. Undoubtedly the disease has been produced by the inhalation of infected sewer gas and Murchison mentions many Cases of this kind Here however the probability is that the germ particles are detained by the fine hairs

in the nostrils or by the mucous of the mouth, and although are swallowed & find their way into the Stomach, & thence into the bowels, Liver, Spleen & Kidneys.

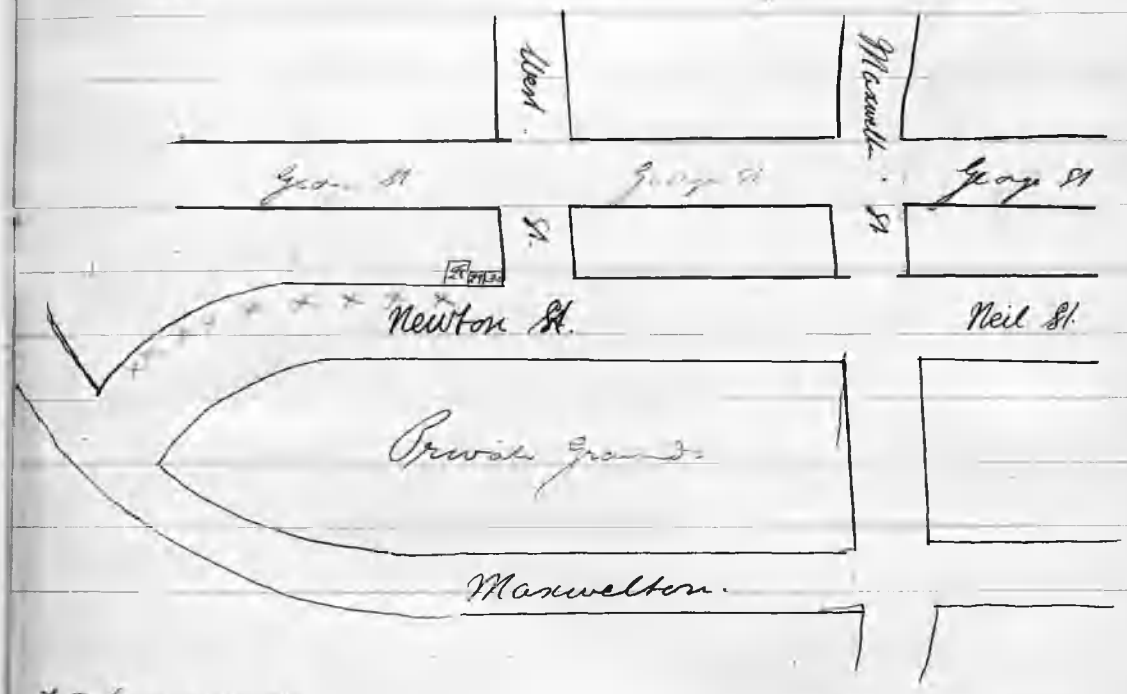
II. The mode of infection through the digestive track is at any rate, by far the most common & under this head comes (a) Infection by the water we drink (b) Infection by milk and (c) Infection by meat.

The propagation of the disease through the medium of drinking water is of immense importance as epidemics so arising naturally affect very large numbers of people whereas the action of sewer gas is confined to a comparatively small number. Large towns furnished with a copious supply of gravitation water run most less risk in this respect than small villages or hamlets drawing their water supply from one or more surface wells into which sewage finds its ways through a porous soil. Even such large towns however are not exempt

from danger as the temporary withdrawal of the water supply may cause sewer gases to be sucked into the pipes thereby the risk of contamination at the reservoir.

The epidemic which broke out in Paisley in August 1892 furnishes an example of an epidemic arising from a local contamination of the water supply. This epidemic affected a very circumscribed area, in fact it was limited almost entirely to one short street which is only built on one side. It broke out in property No 25 within a few days was a very tenement, to the west of West St, with the exception of properties Nos 29 & 30 two very old & dilapidated buildings. Young and middle-aged people were attacked indiscriminately. A few isolated cases occurred in the neighbouring streets, West St & Maxwellton Street were wholly of young people who subsequently were found to have drunk of the water supplied to the affected street at a well which stands in front of property No 17.

Diagram showing street affected by Epidemic August 1892




× = houses affected

The only reason that can be assigned for properties Nos. 29 and 30 being unaffected by the Epidemic are (1) that these are chiefly inhabited by old people and (2) that they are supplied with water from the main in west St., and not from that in Newton St. which was almost the only street affected. This epidemic was at first ascribed to infected milk, one case having occurred in a dairy situated in the street but unfortunately for this theory, this patient

turned ill at the same time as the outbreak in other parts of the street & most of the people in the street prefer to get their milk supply from carts from the country.

In regard to this epidemic the question very naturally is asked "Why was it confined to such a limited area? Why did it not spread more into the surrounding lanes? The answer to this seems to be found in the fact that the Newton St. main is an end-pipe with no branches to other streets.

The Epidemic of August of this year offers a very marked contrast to that of August of last year (1) in the area of distribution and (2) in the class of patients affected. This epidemic is widespread throughout the whole town, rich and poor being attacked indiscriminately, & this offers at least the presumption that the general water supply has in some way become contaminated, and at least calls for some enquiry as to this being the probable or possible source of infection.

In many small towns and villages it is the custom

to cart the contents of middens and ash-pits away to storage ground whence it is conveyed away by farmers and used as manure, instead of being as it ought to be, got rid of by a Destructor.
Such a custom prevails in Paisley and some of this refuse of late years has been taken and used as manure by farmers in the vicinity of the reservoirs.
Now if this refuse be contaminated with Enteric fever evacuations which have not been thoroughly disinfected, sooner or later the germs will find their way into the ground water supply.
When heavy rains occur the germs will either be carried into the reservoir or deeper into the soil. Under such circumstances the current of the subsoil water will be taken away from the reservoir and these germs which have been carried into the soil will not reach the reservoir.
As soon however as dry weather with a consequent rapid fall in the ground water occurs, the current will be towards the reservoir & the germs will be carried into it.
Mr Leis's report & the Robert Paman case took from the date of each Contamination of present Typhoid of the manure will be found to be the source of the Contamination.

Typhoid fever may also be disseminated through the agency of Milk under which may be included ice-cream. It is still an open question whether the lower animals including cows, are liable to Enteric Fever. Numerous experiments by Murchison, Birch-Hirschfeld, Motschutkoffsky on men & the lower animals have so far yielded negative results but extended observations may yet show that the typhoid bacillus in animals produces different clinical & anatomical Changes from what it does in man. Leaving out of account the question whether cow's milk can contain typhoid germs before it has been contaminated by external surroundings, there are 2 ways in which pure milk can be contaminated.

First. Infected water may be added to the milk to dilute it, or the milk may be put into vessels which have been washed by infected water.

Second. Sewer gases containing the germs may gain admission to the milk have a settle on the milk.

The fact of these ways is well established by the Epidemics which broke out in Islington (1870) and

Army (1872) which was investigated by Dr Ballard and also by the epidemic at Marylebone (1873) which was investigated by Messrs Netten Radcliffe and Power.

The epidemic which occurred in Paddy in December 1867 was also considered proven to have originated from a similar source. One of the members of a dairyman's family took Enteric Fever and the stools instead of being disinfected, were thrown in their natural state into an old fashioned middden, & percolated into a pump well which stood - 40 yard.

The epidemic which occurred in July of this year was interesting in as much as there are good grounds for believing that dessicated Enteric organisms found their way into exposed vessels containing ice-cream. One of the members of an Italian ice-cream vendors family had a mild attack of this fever, so mild indeed that it was not at first diagnosed and she was allowed to attend her usual duties of serving in the shop and making the ice-cream

Soon numbers of children in the vicinity of the shop and in the parts of the town and suburban districts were attacked with the disease. These districts were afterwards found to correspond closely with the course taken by the Italian when selling his commodity from a small cart which was sent out regularly.

That flesh meat especially when in a state of putrefaction may convey the poison of Enteric fever seems to be proven by the Epidemic which occurred at Kloten near Zürich in 1878 and also by the outbreaks mentioned by Dr Cayley.

This method of infection must be comparatively rare, however. No outbreak so far as can be ascertained, has occurred in Paris from this cause.

Relation of outbreaks of Enteric to H. Grand water

This subject has attracted the attention of medical Scientists for some considerable time past and before considering its relationship to the epidemics noted on page it may be as well briefly to recapitulate the various views held on the subject.

The idea that epidemics of Enteric Fever had a distinct relation to the level of the ground water, gained prominence from Professor Pettenkoffer's enquiry into the condition of the Wells of Munich. This enquiry led Buhl to the conclusion that these outbreaks almost always coincided with rapid falls in the level of the ground water. Further investigations led Pettenkoffer to adopt the same view.

Buxbaum in his paper on the outbreak of Typhoid in the barracks of Neustift (Zeitsch fur Biologie band VI page 1) brings forward facts which strongly support Pettenkoffer's view

Virchow in his report on the Sewerage of Berlin showed the mortality from Enteric Fever was greatest in July and August, the curve representing this mortality corresponding accurately with the variation in the level of the ground water, the death rate being greatest at the lowest level.

Vogt of Bern (Drinkwasser oder Bodengase) also supports this view and considers the propagation by drinking water illusory.

In opposition to this view medical literature provides abundant material and even in Germany, the home of the theory, strong evidence in contradiction is not wanting. In some epidemics it has been found that the level of the ground water has been rising and not falling, and Soder goes the length of saying that at Bude Both the Enteric Fever mortality and the height of the ground water rise and fall together.

In this Country Dr Buchanan (Medical Times and Gazette March 1870) quotes a case which

apparently support Pettenkoffer's view but he found that in reality the relation was accidental as the efficient cause of the outbreak was the poisoning of the drinking water with Enteric Evacuations.

Dr Buchanan also shows that in certain English towns where the ground water has been lowered by drainage operations, Enteric Fever has diminished and not increased, as it ought to do under this theory. He therefore maintains that while undoubtedly there does exist a connection between the two, it is indirect and the real cause is the impurity of the drinking water (Medical Times and Gazette June 1870). Pettenkoffer contests this view and denies from actual analysis the contamination of the drinking water.

The observations of Pettenkoffer and Buchanan certainly favour the idea that a direct connection does exist in some cases but the frequency and extent of the

connection remains to be determined and in this country other circumstances are far more common as determining causes.

In looking over these two views which naturally strikes one is the apparent antagonism which exists between those who favour water-contamination as the cause and those who uphold the ground water theory. While there can be no doubt that water is by far the most common medium by which infection is conveyed yet in many cases it is the changes in the level of the ground water which liberate the Enteric fever germs & enables them to find their way into wells and even into water mains.

The idea that the falling of the soil water enabled air to penetrate more deeply into the ground than before and thus to set up changes in the organic constituents of the soil, which changes

resulted in the development of a poison which causes this disease in persons exposed to it, cannot now be maintained in the face of Eberth's discovery. This discovery indeed puts a new complexion on the causation and mode of dissemination of Enteric.

The idea which was upheld by Murchison & Jenner that the poison of Enteric fever could be developed by decomposition from the intestinal discharges of persons who were not suffering from the disease, but it could in fact arise de novo, must be considered as erroneous and that observations that fresh Enteric evacuations are not infectious and that the poison is developed outside the human body after an interval, imply that the cause must be a living organism and not merely a chemical substance.

If we consider a town like Paisley where Enteric fever may almost be said to be

endemics, where even at the present days, sudden heaps are in general use, usually, undrained and seldom water-tight, where back courts are unpaved and often the receptacle of the whole discharges of children, and where a complete drainage system is not yet face, you will see that the soil cannot but be impregnated with the germs of the diseases which only wait a favourable opportunity for poisoning the water we drink & the air we breathe.

Experiments on microorganisms have demonstrated some important facts and of the same conclusions held good in the case of the typhoid bacillus as maintained in the case of the micro-organisms, it is easy to conceive how the outbreaks so often follow a rapid fall in the ground water. For the development of most micro-organisms, heat, moisture, light & air are absolutely necessary, and these factors are supplied by such rapid falls.

It is therefore not only possible but probable

most rapid falls in the level of the subsoil water
are coincident with an increase in the power
and number of these germs. Besides the
currents which are necessarily set up in the
soil have the effect of disseminating
the germs throughout the soil.

In regard to the number of cases which
have occurred in Paisley during the last
seven years it will be observed from the
table on page V that the months
when Enteric fever has been really epidemic
have been July August, September and
October, the three first of which it will
be seen from the Meteorological tables
have been the hottest but one and
the driest months of their respective
years. From the consideration of the
mean temperature, rainfall & humidity
it is apparent that the curve representing
the number of Enteric cases does not by
any means correspond to the curves

representing these different factors. In fact it is difficult, if not impossible to trace any definite relation between the rise & fall of the temperature, rainfall and humidity and the cases of enteric.

One fact however is certain & that is that hot dry summers favour the prevalence of Enteric Fever while damp cold seasons exercise a retarding influence on it.

Thus the year 1887 was a very hot & dry year and in the town of Paisley 246 Cases of Enteric came under observation, the largest number which has occurred in any year till the present. The year 1890 again was an exceptionally cold & damp year, and only 55 cases of Enteric occurred.

The present year has been exceptional both for the early advent of Summer and for the long continuance of Summer weather. It has also been exceptional

for the large number of Enteric fever cases which have occurred, 246 being notified in the first eight months and as yet no signs of the epidemic abating.

One fact have to be noted is that the disease does not break out immediately on the advent of hot weather, a distinct interval varying from 2 to 4 weeks seems to intervene thus given the month of July very hot (as occurred last year) the epidemic tends not at the end of the month or the beginning of the next, August given the hot weather in June (as occurred this year) & the outbreaks occurs in July or succeeding months.

Such meteorological conditions, however, cannot be considered as the cause of the outbreak, they play but a secondary & intermediate part in the aetiology of the disease. They merely favour or hinder as the case may be the operation of the real causes.

# Meteorological Observations (1887-1893)

## Mean Temperature for each month (Mean daily).

| Year | 1887 | 1888 | 1889 | 1890 | 1891 | 1892 | 1893 |
|---|---|---|---|---|---|---|---|
| January | 39·1 | 40·9 | 40·5 | 42·8 | 38·5 | 37·6 | 38·1 |
| February | 41·2 | 37·9 | 38·8 | 37·8 | 42·5 | 39·1 | 40·4 |
| March | 40·1 | 38·0 | 41·5 | 43·6 | 39·0 | 38·5 | 44·3 |
| April | 44·3 | 44·5 | 44·5 | 46·0 | 42·5 | 45·4 | 49·7 |
| May | 52·0 | 50·6 | 55·2 | 50·6 | 49·2 | 52·0 | 54·5 |
| June | 58·9 | 55·6 | 59·4 | 54·3 | 58·5 | 53·7 | 59·8 |
| July | 61·0 | 56·0 | 58·6 | 56·7 | 59·7 | 59·3 | 60·0 |
| August | 58·3 | 56·7 | 57·4 | 57·3 | 57·7 | 56·0 | 61·2 |
| September | 53·7 | 53·7 | 54·2 | 58·2 | 56·1 | 52·0 | |
| October | 46·4 | 49·0 | 47·0 | 49·7 | 42·5 | 44·3 | |
| November | 40·9 | 43·8 | 44·7 | 42·5 | 42·1 | 43·0 | |
| December | 37·7 | 42·4 | 40·9 | 35·9 | 40·3 | 35·5 | |

## Meteorological Observations (1887-1893) (Contd)

### Hyderabad — Amount of rain in inches

| Year | 1887 | 1888 | 1889 | 1890 | 1891 | 1892 | 1893 |
|---|---|---|---|---|---|---|---|
| January. | 2·58 | 3·02 | 2·57 | 6·81 | 4·03 | 3·81 | 1·85 |
| February. | 3·47 | 0·66 | 2·93 | 0·83 | 0·75 | 2·24 | 4·72 |
| March. | 2·05 | 3·37 | 1·54 | 2·97 | 1·98 | 0·69 | 2·01 |
| April. | 1·97 | 1·83 | 2·58 | 1·61 | 1·07 | 1·03 | 1·40 |
| May. | 0·84 | 3·61 | 3·15 | 3·03 | 1·85 | 4·22 | 3·07 |
| June. | 0·74 | 2·53 | 0·59 | 4·36 | 1·48 | 3·51 | 2·18 |
| July. | 2·41 | 5·21 | 1·75 | 3·91 | 0·97 | 1·84 | 1·46 |
| August. | 2·95 | 2·59 | 5·19 | 2·56 | 5·45 | 7·55 | 3·82 |
| September | 3·44 | 0·95 | 1·50 | 3·70 | 4·78 | 5·31 | |
| October. | 1·95 | 1·70 | 3·71 | 3·29 | 4·54 | 4·03 | |
| November. | 3·51 | 5·10 | 2·36 | 3·14 | 4·05 | 5·24 | |
| December. | 3·72 | 3·91 | 3·83 | 1·24 | 7·74 | 1·97 | |

## Meteorological Observations (1887-1893 Contd)

### Hygrometer - Humidity (Sat. 100).

| Year | 1887 | 1888 | 1889 | 1890 | 1891 | 1892 | 1893 |
|---|---|---|---|---|---|---|---|
| January. | 87 | 88 | 91 | 85 | 83 | 83 | 83 |
| February. | 87 | 84 | 83 | 83 | 86 | 83 | 84 |
| March. | 84 | 85 | 84 | 78 | 78 | 83 | 85 |
| April | 79 | 77 | 77 | 72 | 73 | 78 | 79 |
| May. | 74 | 76 | 80 | 74 | 59 | 74 | 80 |
| June. | 73 | 75 | 71 | 81 | 75 | 80 | 75 |
| July. | 75 | 81 | 76 | 75 | 76 | 75 | 79 |
| August. | 77 | 81 | 93 | 81 | 81 | 75 | 80 |
| September. | 86 | 86 | 93 | 81 | 81 | 86 | |
| October. | 81 | 84 | 86 | 93 | 86 | 84 | |
| November | 92 | 84 | 85 | 85 | 92 | 92 | |
| December | 86 | 89 | 84 | 82 | 92 | 94 | |

## Prevention of Enteric Fever.

In considering the prevention of Enteric Fever one important point to remember is that the main mode of propagation of the disease is by the Intestinal discharges of persons sick with the disease although other modes such as exhalations from the skin & the urine have not been disproved.

While there are certain measures incumbent on those in attendance and on such cases and on the Sanitary Authorities yet there are initial difficulties, the importance of which cannot be over-estimated and which in many instances cannot be overcome

In the first place ya have the difficulty of diagnosis This fever is one of the most difficult to diagnose accurately because it varies so much in the Severity and Character of its Symptoms Some Cases are so slight that often among the Common people, no medical man is in attendance throughout the whole duration of the

X This is surely a very strong argument for an alteration in the form of notification. The point required by the Act ought to be (if it is not) the earliest possible notification of a suspicion of infection, not the completed diagnosis of the supposed infecting disease.

I should like this point clearly brought out, if any further use is to be made of this Return.

WB

illness. Even if he is called in he may naturally hesitate to give a decided verdict in favour of the case being one of fever, until he has had the it under observation for some time. In my own experience I have frequently found people delay calling in their medical attendant because of their dread that he would pronounce it fever, seemingly going on the principle that "what ya don't know does ya no harm" and it is only when they see the patient sinking or Typhoid State that they are forced to get medical advice. By this time however, incalculable harm has probably been done. The faeces has been all along thrown into the common middenstead without any attempt at disinfection, and other members of the family have been exposed to the disease probably even sleeping with the patient and then going either in public works where they are brought in contact with hundreds of their fellow workers or into School where they are running about

and playing with the children. A few weeks ago I was called to see a child with a sore throat. who had been ill for 4 days before medical advice was sought. This delay was due, I found, to the parents belief that it was Scarlet Fever, they have had to deal with. They made no attempt at isolation but whenever the case was pronounced one of virulent diphtheria, all the children were sent out of the house as much as possible to prevent the disease from spreading. But with what result? Within a week the other 3 children were down with the disease, and then the mother and a neighbouring girl who had frequented the house were also seized with it.

What such a delay occurs with fairly well-to-do people in a violent case of diphtheria what can one expect in cases of Enteric, looking to their clinical phenomena.

The adoption of the Notification act is in great part, to blame for this hesitancy on the part of parents because of the great turmoil which is

* There is a good deal of truth in this. But the moral of it is, not to omit notification, but to make it so clear that every case of probable infection will be dealt with, that no delay can occur for the causes stated. WMS

at once raised when such a case occurs. Sanitary Inspectors, often two or three of them, call, orders are given for immediate removal to the Hospital, clothes are carted away and often people are put out of their home for half-a-day until fumigation has been completed. No wonder that the common people who do not appreciate the purpose of these various acts, dread, not so much the fever, but the fact of its being known.

In the second place you have the filthy habits of some of the poorer classes to contend with, which habits are to blame in many cases for the propagation of the disease as well as others. While a distinction is often drawn between "clean dirt" and "dirty dirt", no one would think of classifying human excreta under the former of these terms. Yet I have known a case where it was the custom in the home to keep the urine in a large tub in the Kitchen from one week's end to the other. Some members of the family slept

in the kitchen & this urine was kept for washing clothes in because it was firmly believed that it possessed peculiar cleansing properties.
Fortunately cases so bad as this are rare but in the poorer localities all gradations of filth and dirt are to be found.
In such cases legal statutes are of no avail. What is necessary, is to educate the people to the dangers of filth of every description lying about the house. Sanitary authorities may provide every sanitary appliance for the use of the people but these will be of no avail unless the people are taught how to use them and at least try to follow out the ordinary rules of health.
Then mild cases of Enteric especially when they occur among the poorer classes, are fraught with danger to the whole community but it is difficult, if not impossible, to devise means whereby this danger may be avoided.

The difficulty of diagnosis may be illustrated by a case which occurred about 2 years ago. One night I was called to attend Mrs A— who had every symptom of having a miscarriage but under proper treatment, these symptoms disappeared, and I was to see her a few days. The foetus came away and was found to be of normal appearance and about five months old. The mother made a good recovery though slow, having been confined to bed altogether about 3 weeks. During her illness the thermometer was used regularly & the temperature was never found above 100°, her pulse slow and strong. A natural enquiry as to the cause of the miscarriage could elicit no information. Shortly after the recovery I saw all the members of the family (5 in number) who had lived up with Enteric and one of them died. Looking to these facts one naturally comes to the conclusion that the cause of the miscarriage was Enteric fever although during the whole illness, not a

single symptom suggestive of this disease manifested itself.

The measures to be adopted by the people themselves for the prevention of Enteric may be summed up thus:—

(1) the immediate and efficient removal of all filth from the house (2) the calling in of medical advice whenever illness such as especially of Enteric fever be apprehended at the time.

Medical men shall also advise the thorough disinfection of the patient's stools & urine whenever there is the slightest suspicion of this disease, without waiting for confirmation. Should there be any doubt as to the nature of the illness the patient should be at once isolated, all evacuations received into vessels kept strictly for the use of the patient and mixed with Mercuric Chloride or ferrous sulphate or Carbolic Acid. It has been recommended that even when the discharges should not be emptied into a closet, sewer or

Must if in earth

cesspool but buried several feet deep and filled well with earth. Such a plan is a large town is dreadful enough, but even if it were not, the advisability is questionable because of the disinfection of the stools be imperfectly performed the burial of the stools will become a danger as it is soon found polluted by Vibrio cholerae when a man suffering from Enteric was brought to a village and his evacuations were buried in a deep heap. Some weeks later, 5 persons employed in the removal of part of the heap were attacked with the disease. Their evacuations were buried deep in the heap. Still months later the heap was cleared out by 2 work-men, one of whom died from the disease. A case such as this shows the danger there is in burying the stools. If a case and a danger will not exist if the stools be thoroughly disinfected, but at the same time no danger will exist from putting the disinfected stools into the common sewer. It would be much better if all

such stuff can be destroyed by fire as is done usually in the case of Cholera.

Regarding the measures to be adopted by the Sanitary authorities in a town such as Bailly.

I Old forbidden middens-heads should be altogether abolished and replaced by efficient water closets, flushed under competent supervision and by wooden or galvanized boxes for the reception of ashes and slops. These wooden boxes should be emptied regularly and not allowed to stand until they are surrounded by a heap of dirt about a foot high.

If sufficient water cannot be had for the flushing, care should be exercised to see that the middens-heads are water tight, efficiently drained and far enough removed from all dwellings to prevent the near possibility of becoming a nuisance.

II All back courts should be paved and kept as far as possible free from filth

of all kinds.

III As undoubtedly water is the most common mode of propagation of the diseases, great care should be exercised to render that element above suspicion. No foreign matter should be allowed to be deposited in the neighbourhood of the reservoirs and the drainage waters from cultivated fields should not find entrance into them. The the filtering apparatus should be regularly inspected and cleaned so that no difficulty defect can exist for any length of time without being found out and remedied.

IV Seeing the level of the ground water presents an important though indirect influence on outbreaks of Enteric it might be advisable to render the soil as dry as possible so that any great variation in the level of the ground water would be impossible. This can be done either by deep drainage or by opening the

outfall. The laying of drainage pipes after carries off subsoil water by leaving spaces along the course of the sewers but this is an inefficient plan. It is much better to have special drains laid by the side of, or under the sewers, to carry off the ground water. It may be stated as a general rule that deep subsoil drainage (the drains being 8 or 10 feet deep and 70 to 20 feet apart) is useful in all soils except the most impermeable.

In this connection it may be mentioned that Dr Buchanan in the Medical Times & Gazette March 1870, brings forward in answering for why that in many English towns when the ground water has been permanently lowered typhoid drainage fever has almost entirely disappeared.

I The dead ends of water pipes should be avoided as far as possible and where present they should be regularly flushed out so as to avoid any accumulation of sediment.

VI When a widespread epidemic is threatened ~~the fear~~ where origin cannot be traced the precaution should be taken of warning the inhabitants not to drink water unless it has been previously boiled.

VII Care should be taken that all water closets be efficiently trapped and that the water supplying the cisterns for them, be not used for cooking or drinking purposes.

Finis

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